

HUMOR 20

High Accuracy Humidity Calibrator

The role of humidity calibrations that are accurate, reproducible, and documentable is becoming more and more important.

ISO quality guidelines and regulations according to FDA guidelines in the pharmaceutical industry, etc., require that humidity instruments have a traceable, accurate calibration.

The humidity calibrator HUMOR 20 developed by E+E is the ideal reference instrument for these requirements.

HUMOR 20 can be used in the humidity range of 10-95% RH both for monitoring cylindrical sensors (transmitters, hand-held instruments,...) and also for monitoring instruments with cubic dimensions (data loggers, wall instruments,...). A temperature sensor integrated in the measurement chamber also permits the monitoring of an optional temperature output.



The HUMOR 20 is traceable to international standards and can be delivered with an official, internationally recognised OEKD calibration certificate. Due to its high accuracy, the HUMOR 20 is the basis for accredited calibration laboratories for relative humidity.

Based on its operating principle, the HUMOR 20 can be used under typical conditions in a laboratory climate. This means that expensive, fully air-conditioned rooms are not necessary. For operation HUMOR 20 requires only distilled water, filtered oil-free air with a pressure of 10 bar and a power supply between 90-230V AC. The specimen can be powered by 24V DC that is available directly on the HUMOR 20.

A software package included in the scope of supply allows the user to record the calibration process and to adjust the HUMOR 20. The connection to a PC is realised over a typical RS232 interface (COM port).

Operation:

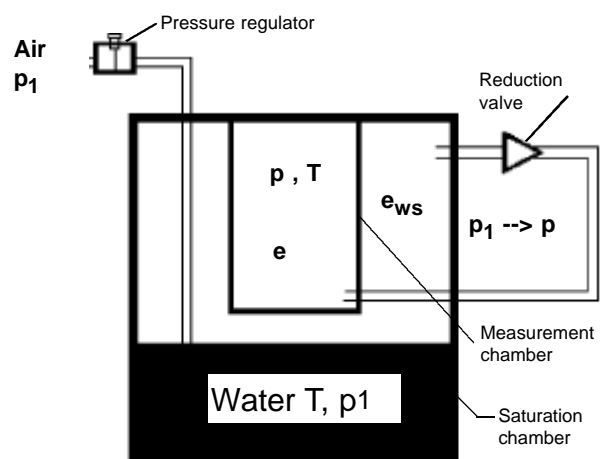
The operation of the HUMOR 20 is based on a fundamental two-pressure process and thus is similar to instruments used in national bureaus for standards. Air or nitrogen at a pressure p_1 is led through a water-filled saturation chamber and saturated to 100% RH at p_1 . By means of a reduction valve, the saturated air is reduced to the ambient pressure p and fed into the measurement chamber. Due to the construction, the saturation chamber and the measurement chamber are at the same temperature. Under these conditions, the water-vapour partial pressure e_{ws} is reduced at the same ratio as the total pressure.

Essentially, the following applies:

$$e = e_{ws} * p / p_1$$

From this it follows that: $RH = e / e_{ws} = p / p_1$

Thus, the generated relative humidity essentially depends on the ratio of the two pressures. Construction-specific deviations from this ratio are corrected during factory adjustments. By adjusting the pressure p_1 the relative humidity is brought to the desired value in the measurement chamber.



Schematic Illustration of a Two-pressure Reactor

Practical Software Tools

The software tools included in the scope of supply with the HUMOR 20 allow the user to print out calibration protocols, to record measurement values in a log file and to configure or to readjust the HUMOR 20.

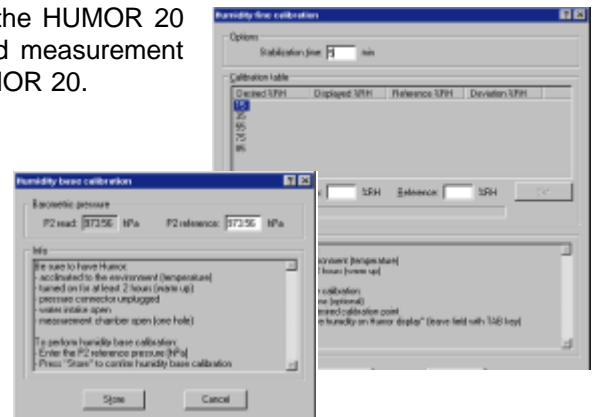
Measurement Software - Features:

Creation and print-out of clear, professional calibration protocols with:

- Specimen number
- Calibration date
- Reference and actual values

Configuration Software - Features:

- Temperature display on the HUMOR 20 can be switched between degC and °F
- 1-point customer humidity calibration of the HUMOR 20
- 6-point customer humidity fine calibration of the HUMOR 20
- 1-point customer temperature calibration
- Reset of HUMOR 20 to factory calibration



Calibration and Adjustment using HUMOR 20

The construction of the measuring chamber allows the calibration and adjustment of cylindrical sensor probes with a diameter of 8-25.5 mm (hand-held instruments, duct-mounted versions, ...) as well as of cubic measuring units (room transmitters, data loggers, ...) with maximum dimensions of 100x85x40 mm or 95x95x40 mm. For the electrical power supply of the specimen, 24 VDC is available on the instrument. In addition, 2 measurement inputs for voltage or current outputs from transmitters are available on the HUMOR 20.

Transmitters with separated sensor probe

Depending on construction and size of the specimen, up to 3 instruments can be calibrated simultaneously. For precise calibration, the diameter of the cover feedthrough has to match the probe diameter. For this purpose, various probe diameters are available for corresponding cover configurations. Due to the typical response time of capacitive sensor probes, a stabilisation time of approximately 20 minutes per measuring point should be allowed.



Compact room transmitters

By using the Plexiglas cover (standard supply), it is possible to calibrate and adjust compact room devices (e.g., the EE10) with the HUMOR 20. The overall accuracy of the calibration is influenced by the absence of the metal cover. The additional error depends on the position of the specimen in the chamber as well as on the relative humidity.



Typical Applications

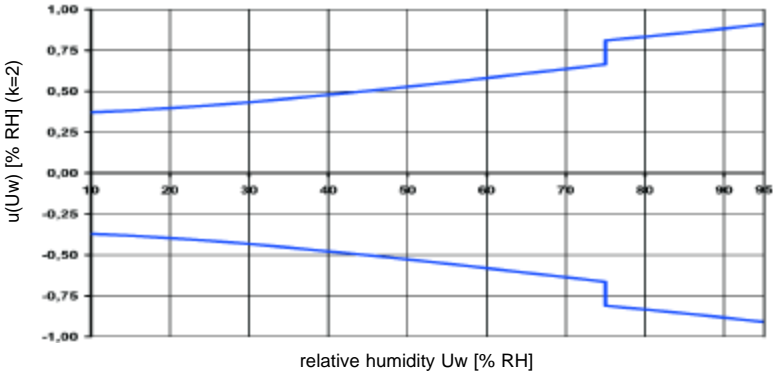
calibration laboratories
reference device
bureau of standards
manufacturers of measurement instruments

Features

highest accuracy
independent of ambient temperature
easy handling
traceable to international standards
OEKD certificatable

Technical Data

General

Function principle	two-pressure-reactor		
Working range	10...95% RH		
Inaccuracy of measurement ^{1) 2)}			
Inaccuracy temperature measurement in measuring chamber ²⁾	typ. ± 0.3 degC		
Power supply	90...230V AC		
Work equipment	<ul style="list-style-type: none"> • compressed air, filtered and free of oil or nitrogen N₂ with max. 10 bar • distilled water 		
Stabilisation time HUMOR 20	< 3 min/measuring point		
Stabilisation time specimen	typ. 20 min/measuring point		
Integrated power supply	24V DC, max. 200mA		
Number of measuring inputs	2 (switchable between 4...20mA / 0...20mA / 0...1V / 0...5V / 0...10V)		
Typ. error for display inputs	Voltage measuring: < 5mV Current measuring: < 30 μ A		
Display	Dot-matrix display with backlight		
Gas flow	3 l/min for RH > 85% the gas flow is reduced to 1.5 l/min at 95% RH		
Recommended interval for recalibration	1 year		
Interface for PC connection	RS232 (COM port)		
System requirements for software tools	MS Windows 98 / ME / NT 4.0 with SP 6a MS Windows 2000 with SP 2 / Windows XP		
Environmental conditions	temperature:	10...40 degC	
	humidity:	10...80% RH	
Applied harmonised standards	EN 61000-6-3	EN 61000-6-4	EN 60068-2-6
	EN 61000-6-2	EN 61010-1	EN 60068-2-29
	OEVE EN 61326-1+A1+A2		
Dimensions	400 x 260 x 240 mm		
Weight	about 23kg (HUMOR 20)	about 36.5kg (HUMOR 20 incl. packaging)	

¹⁾ The extended inaccuracy of measurement results from the standard inaccuracy increased by a multiplying factor of K=2.

²⁾ Valid for the standard cover

Accessories

Compressor with oil separator

Technical data

Max. operation pressure	12 bar
Supply voltage	230V AC or 115V AC
Working temperature	-10 ... +70 degC



Optional covers for the measuring chambers

The standard scope of supply of HUMOR 20 includes a measuring chamber cover that can accommodate two sensors with a diameter of 12mm (E+E standard sensor). Additional measuring chamber covers for sensor tube diameters of 8-25.5mm are available as accessories.

PROBE DIAMETER [mm]	NUMBER OF FEEDTHROUGHS	TYPE
8 - 12	3	HA 02 02 04
12 - 16	2	HA 02 02 01
16 - 20.5	1	HA 02 02 02
20.5 - 25.5	1	HA 02 02 03

Calibration certificate

To meet with the requirements of Quality Management Systems such as ISO9001 regarding calibration and certification of measurement and test instrumentation, the HUMOR 20 is supplied with a factory works certificate according to DIN EN 10204 - 2.3.

Optionally the HUMOR 20 is available with an official OEKD accredited calibration certificate.

This OEKD accreditation guarantees the following measuring uncertainty:

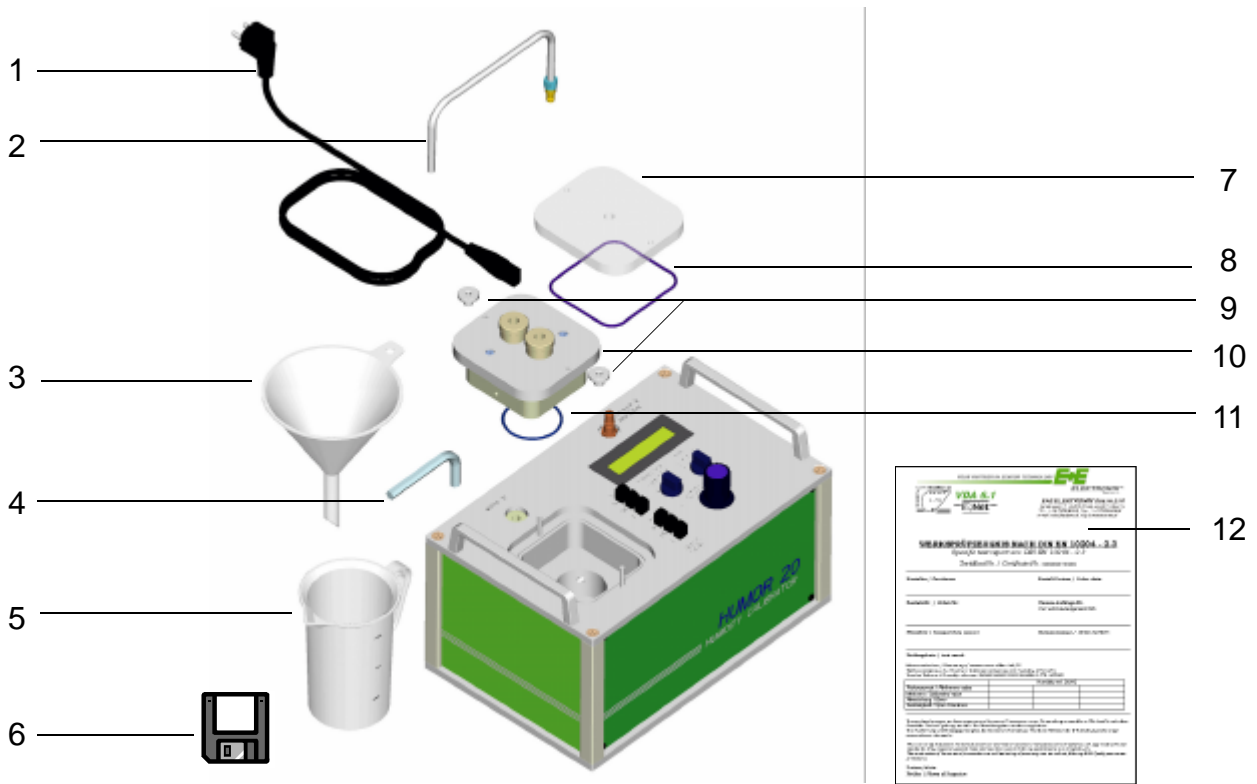
RH range Measuring uncertainty (at 25 degC ± 3 degC)

< 35% RH	±0.2% RH
35...60% RH	±0.35% RH
60...95% RH	±0.5% RH

(for dew point temperature -10 degC...60 degC and measuring temperature 0 degC...70 degC)



HUMOR 20 - Scope of Supply



- | | | | |
|---|------------------------------------|----|---|
| 1 | Power supply cable | 7 | Plexiglas cover for room transmitter testing |
| 2 | Water drain pipe with connector | 8 | O-ring for room transmitter |
| 3 | Funnel | 9 | Knurled nut |
| 4 | Allen key (10 mm) | 10 | Cover for humidity sensor with 12 mm probe diameter |
| 5 | Measuring beaker | 11 | O-ring |
| 6 | Measuring and calibration software | 12 | Works certificate according to DIN EN 10204-2.3 |

Ordering Information

HUMIDITY CALIBRATOR

HUMOR 20

HUMOR20

ACCESSORIES

Compressor with oil separator for 220V power supply	HA 02 01 01
Compressor with oil separator for 110V power supply	HA 02 01 02
Cover for measuring chamber for 8 - 12mm probe diameter	HA 02 02 04
Cover for measuring chamber for 12 - 16mm probe diameter	HA 02 02 01
Cover for measuring chamber for 16 - 20.5mm probe diameter	HA 02 02 02
Cover for measuring chamber for 20.5 - 25.5mm probe diameter	HA 02 02 03
OEKD calibration certificate	HA 02 03 01

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